advantage that it can be installed in many places in the country, and that it requires little power. It has probably a great future before it—certainly immediately—but whether it is ultimately destined to be supplanted by the synthetic process time alone can show.

The cyanide method is still in process of development, and is carried out in various ways. Several concerns are working it, among them the Nitrogen Products Co. at Saltville, Virginia, and the Air Reduction Co., and the Government is also building a plant. The product first formed is sodium cyanide, which, as in the case of cyanamide, can be made to yield ammonia under the action of steam. Sodium cyanide is, however, so valuable as a metallurgical adjunct that it will not pay to convert it into ammonia until the market for cyanide has been satisfied.

The synthetic process was already worked in America by the General Chemical Co. before the outbreak of war, and it had so far perfected the process—well beyond the point which the Germans had reached—that it was able to operate at lower temperatures and pressures. The Government has taken over the process of the company, and is now working it at Sheffield, Alabama, with a plant capable of producing 20,000 tons of ammonium nitrate per annum. A portion of the ammonia produced is put through the oxidation process, converting it into nitric acid, which is combined with more ammonia to form ammonium nitrate.

The arc process is especially suitable for the production of nitric acid. The reactions involved are chemically very simple, but they need a large amount of energy, which, under American conditions, would be very expensive to produce. By recent agreements with the Norwegian Government the United States and the Allies will receive about 112,000 metric tons of calcium nitrate per annum, made by the arc process, as against the limit of 8000 tons sent to Germany. As matters stand it is very unlikely that the arc process will obtain any very extensive application in America.

Prof. Noyes concludes his lecture with some remarks upon the relative economies of the different processes, but the conditions at present are so abnormal that it is impossible to make any very definite statements as to their ultimate commercial prospects. In the meantime the Government is using all its resources, expanding its imports of Chile saltpetre, introducing as rapidly as possible "by-product" coke-ovens, and developing new fixation processes through the Nitrate Division of the Ordnance Department with the co-operation of the Bureau of Mines.

The oxidation process of turning ammonia into nitric acid has been so far perfected that a conversion of from 92 to 95 per cent. is now possible, and the process of absorption of the nitric vapours has been much simplified. It is certain that, as one result of the war, there will be a very marked development in the States within the next year or two of American processes of nitrogen fixation.

INDIGO IN BIHAR.

AN account of the recent history and present position of indigo in Bihar, by Mr. W. A. Davis, indigo research chemist to the Government of India, was reviewed in NATURE of July 18 last. In two further communications Mr. Davis has discussed the future cultural prospects of the industry,[1] outlined the difficulties to be surmounted if success is to be attained, and detailed the conclusions indicated by a study of Bihar indigo-soils.[2]

Among the various factors—careful seed-selection, improved cultivation, better manufacture, and sounder business organisation—on which the fate of natural indigo depends, the most urgent is the cultural. The evidence presented indicates that the indigo-soils of Bihar have been steadily losing fertility through exhaustion of their available phosphate. This conclusion is based on the results of actual soil-analyses, the success with indigo grown outside Bihar in soils still containing adequate available phosphate, and the response of indigo within Bihar to the manurial use of superphosphate.

The treatment appropriate for *Indigofera sumatrana,* until 1898 the indigo exclusively grown in Bihar, does not suit *I. arrecta,* introduced in 1899. After this difficulty was overcome the results with *I. arrecta* appeared to justify the hope that extended cultivation of this new plant might save the natural indigo industry. The product of *I. sumatrana* may no longer be expected to compete successfully against artificial indigo. But actual results, secured in 1906–7, indicate that natural indigo from *I. arrecta* may be manufactured and profitably sold at rates " cutting " the lowest pre-war quotations for synthetic.

The disappointment of this hope is popularly attributed to two blights—*psylla* and "wilt." The entomological malady can scarcely be accounted serious. There is no evidence that *psylla* injures indigo of normal vigour; there is evidence that affected plants which regain thrift may " grow through " and " shake off " *psylla* attack. The " wilt " is not induced by any pathogenic organism; it is the sequel to defective nutrition, explicable by the phosphate-exhaustion now characteristic of Bihar soils.

The remedy then for Bihar is to employ superphosphate. Even so, the only hope for the future lies in the cultivation of *I. arrecta;* that of *I. sumatrana* is contra-indicated on economic grounds. Seed-selection to secure strains of *I. arrecta* rich in indican is also a pressing need. There is doubtless another possibility. Outside Bihar, under climatic conditions hitherto deemed unsuitable for indigo, *I. arrecta* thrives well. It may in time prove more economic to transfer indigo from Bihar to localities with soils sufficiently rich in available phosphate than to transport phosphate to indigo in Bihar.

What lies outside debate is that, if the natural

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[1] "The Present Position and Future Prospects of the Natural Indigo Industry." By W. A. Davis, Indigo Research Chemist to the Government of India. *Agricultural Journal of India,* vol. xiii., part iii. (July, 1918).

[2] "A Study of the Indigo Soils of Bihar." By W. A. Davis. Agricultural Research Institute, Pusa, Indigo Publication No. 1 (1918).

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indigo industry is to survive, *I. arrecta* must receive the phosphate it needs. So far as the cultural factor is concerned the future depends upon the indigo grower. Unless he is prepared to supply his plant with the food requisite for its vigorous thrift, and to do this without further demur and delay, the end of the war must mean the end of natural indigo, not in Bihar alone, but throughout India.

NOTES.

We regret to learn that the Natural History Museum is losing the services of Mr. W. R. Ogilvie-Grant, assistant keeper of the department of zoology and head of the Bird Room, who has been compelled to relinquish his appointment owing to continued ill-health. Mr. Grant has served in the museum for thirty-six years, having entered the department as an assistant in the year 1882. He is the author of the official catalogue of the game-birds, and joint author with the late Dr. R. Bowdler Sharpe of two other volumes of the great British Museum Catalogue of Birds. Mr. Grant was for many years editor of the Bulletin of the British Ornithologists' Club, and he carries with him in his retirement from official harness the good wishes and esteem of his many friends and brother ornithologists.

We learn from the Journal of the Washington Academy of Sciences that Dr. Cleveland Abbe, meteorologist of the U.S. Weather Bureau, and editor of the *Monthly Weather Review*, has been removed from his positions, the reason given being his "long-standing and generally well-known friendly sympathies for the Imperial German Government." It is stated that Dr. Abbe has denied disloyalty, and asked to be given an opportunity to reply to any charges presented.

Prof. C. A. Pekelharing has retired from the chair of physiological chemistry in the University of Utrecht, and has been succeeded by Dr. W. E. Ringer, one of his former assistants, and originally an inorganic chemist.

According to the *Nieuwe Courant* of August 24, Prof. Haeckel's house at Jena, Villa Medusa, will be transformed into a Haeckel museum and presented to the University. It will contain Haeckel's extensive collections, and be combined with an institute for general developmental theory. The Carl Zeiss foundation is giving financial aid.

The *Times* announces that Mr. V. Stefansson, the leader of the Canadian Arctic Expedition, has arrived at Dawson on his way to Ottawa. Mr. Stefansson's expedition left Esquimault in the summer of 1913 to explore the Beaufort Sea and adjacent islands of the Canadian Arctic Archipelago. It will be remembered that his chief vessel, the *Karluk*, was crushed in the ice in January, 1914. Three members of the expedition lost their lives on that occasion, Dr. Forbes Mackay, Mr. James Murray, and M. Henri Beuchat. Mr. Stefansson, with several members of his staff, was ashore at the time the *Karluk* broke adrift, and he continued the work of the expedition. The southern party, under the leadership of Mr. R. M. Anderson, returned in the autumn of 1916 after doing a considerable amount of work in the Mackenzie delta and the coast of the mainland to the east. Mr. Stefansson himself discovered new land north of Prince Patrick Island in June, 1915, and further land north-west of Banks Land in 1916. No news of his discoveries since that date has yet been announced, but Mr. Stefansson has probably been engaged in extending his explorations, in surveying his discoveries, and in studying the Eskimo. He announces that he intends to return to the Arctic in a year's time. There has been no news of Mr. Storkersen, a member of the expedition, who, with three Eskimo, left Herschell Island last winter in an attempt to reach Melville Island across the sea-ice, since April last, when he sent back word that he had gained a point 175 miles north of the Alaskan coast.

We regret to record the death of Lord Forrest, which occurred at sea last week on his voyage from Australia to England. Lord Forrest, better known as Sir John Forrest, was born in Australia of Scottish parents in 1847. He entered the Survey Department of Western Australia in 1865. In 1869 he undertook to search for traces of the German explorer Leichhardt. Though he failed in the main object of his expedition, Forrest made many discoveries. In 1870 he explored the south coast of Australia from Perth to Adelaide, and in 1874 he accomplished a journey through the heart of Western Australia. Starting from Champion Bay, he struck north-east to the Murchison River, which he followed to the Robinson Ranges, and then went along the 26th parallel to Peake Station on the overland telegraph, where he turned south and reached Adelaide. This remarkable journey of about 2000 miles was accomplished in five months, and proved that the interior of the colony was useless for settlement. In succeeding years Forrest surveyed the country between Ashburton and Lady Grey Rivers, and the Fitzroy district. From 1883 to 1890 he was Surveyor-General of Western Australia, and in 1890 became Premier. In 1901 he joined the Commonwealth Government, and served successively in several capacities. He had been a ceaseless advocate of a transcontinental railway, and regarded the completion of the line from Perth to Adelaide as the triumph of his political career. Lord Forrest was a gold medallist of the Royal Geographical Society and an LL.D. of Cambridge, Adelaide, and Perth.

By the death of Sir Ratan Tata, which occurred on September 5, at the age of forty-seven, a notable figure in the industrial and philanthropic life of India and England has disappeared. The son of Mr. Jamsetjee N. Tata, the well-known Parsi capitalist of Bombay, he married the daughter of Ardesir Merwanji Seth, the head of the priestly community of the Bombay Parsis. Mr. Jamsetjee N. Tata, who died in 1904, had planned various industrial enterprises, which he left to his sons, Sir Dorab Tata and Sir Ratan Tata, to bring to completion. One of these schemes was the establishment at Mysore of the Indian Institute of Research for the promotion of scientific, medical, and philosophical studies. His sons carried out his intentions, and provided a liberal endowment for the institute. Sir Ratan Tata's fame rests on his development of the Indian steel and iron works, for which the preliminary investigations were made at his expense by a staff of European and American experts. He and his brother, Sir Dorab Tata, carried out this enterprise, and founded the great metal works at Sakchi, the capital of which amounts to some millions sterling. Another scheme due to the brothers was to store and utilise the heavy rainfall of the Western Ghats for the supply of cheap and abundant electrical energy at Bombay, a work which has few parallels in other parts of the world. Sir Ratan Tata had long resided at York House, Twickenham, and at Versailles. In London he was deeply interested in scientific and philanthropic projects. He founded the Ratan Tata Department of

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